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NOVEMBER, 1938



VOLUME XV, NO. 8

THE TECHNICAL ORGANIZATION
OF SMALL MANUFACTORIES



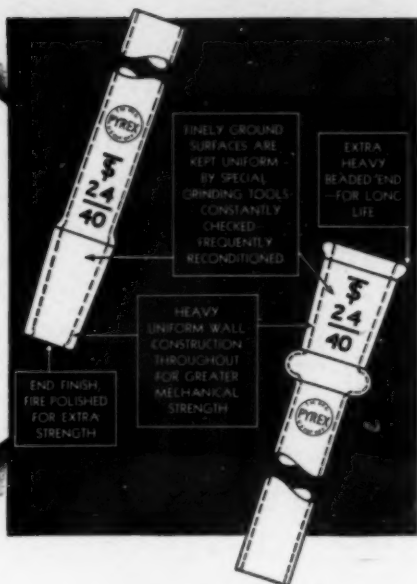
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The CHEMIST

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THE AMERICAN INSTITUTE OF CHEMISTS

HOWARD S. NEIMAN, *Secretary*

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4. Clrves, Paper Trade, 90, No. 10:63 (1930)

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This Question of Licensing

by Robert J. Moore
President

THE AMERICAN INSTITUTE OF CHEMISTS

THE following paragraphs are excerpts from a letter in answer to a chemical executive's statement:

"... However, I cannot convince myself that much lasting good will come from the much talked of idea of licensing the chemists to carry on their professional work. This question has several sides, and I am one of those who are very much afraid of the back-slap we would get from such procedures. Regulation has its advantage, but it also has its disadvantages . . . "

... The question which you raise as to the advisability of state licensing laws is, of course, debatable. It will be one of THE AMERICAN INSTITUTE OF CHEMISTS' most important topics during the coming year. We are beginning to realize, however, that whether we are actively for such laws or against them, the question is largely out of our hands. State legislatures are going to pass license laws whether or not we advocate them. Just as New York State requires the licensing of professional engineers, physicians, lawyers, dentists, pharmacists, and even trades such as electricians and plumbers, so they will require a licensing of chemists. If this is so, then it is better for our profession to prepare the bill and advocate it, rather than to sit idly by while a group of legislators frame a loose classification, defining the term "chemist" without requiring adequate training and experience in practice. Legislative action should be compounded of deliberation and execution but the latter does not always follow the former. Without the aid of our professional organization and possibly with the connivance of individuals or organizations of questionable training, legislators may be induced to recognize as chemists pharmacists having no adequate degree in chemistry, laboratory helpers who may have a few years' experience or, as in a bill recently offered, "anyone with five years' experience in a drug store."

Aside from the threat of what may happen if we do not lead in this legislation, are the many positive benefits which would result from properly formulated license laws. A state license law is the only legal protection of the title or status of "chemist". And, until

it is so defined, as exactly as lawyer and physician are defined, we can have no legal protection for the profession. The looseness with which the term chemist is used today is a direct threat to our professional and economic future. The public and, too frequently, the business man and prospective employer of chemists vaguely consider the chemist as someone who has something to do with the corner drug store. Recent events, moreover, give to the layman the impression that chemistry is a trade and the chemist a mere artisan. Witness the recent front-page newspaper reports of a strike called at the plant of the Aerovox Corporation of Brooklyn, New York. The account tells the public that "the strike was called by two C.I.O. unions, the United Electrical, Radio and Machine Workers, and the Federation of Architects, Engineers, *Chemists*, and Technicians"! The professional status of the chemist is here completely submerged in a labor organization. It is to make state licensing laws fundamentally sound and to prevent such perversions of the profession of chemist, that we must direct our efforts.



The Registration of British Chemists

According to *The Chemical Trade Journal and Chemical Engineer (London)*, the Council of the British Institute of Chemistry will again attempt to convince its membership of the professional advantages to be gained by the adoption of the Supplementary Charter. A committee has been appointed to redraft this charter, which was voted down by the members last year, and to present it at the annual meeting next March. The modified Charter will include a proposal to divide the Institute's membership into those who have been accepted, through the regular examinations, as full members, and those who would merely be registered as accepting the Institute's code of professional conduct. Mr. E. Thornton said that the occasion might arise when the State desired to have one body which would provide a register of reliable and qualified chemists over whom it exercises disciplinary control, and that the Supplementary Charter would enable the Institute to cooperate with the State by becoming that body.

The Technical Organization of Small Manufactories

By Henry Eckhardt, F.A.I.C.

IT IS the custom for industrial managers to advise young men with professional training how to succeed in industry. In this paper the tables are turned, and managers in small plants are advised how to succeed in management. As a matter of fact, the advice is extended obliquely to managers with the hope that it comes to the attention of owners and directors of ailing plants. This advice is applicable particularly to medium-sized independent plants in the chemical and allied processing industries which have outgrown their earlier small stage, yet continue to operate as a small plant under a condition which might best be described as an unorganization.

The scope of this paper is restricted to the discussion of the problem of organization of the technical staff in a small manufacturing plant, but implicitly it criticizes the general problem of management, since the technical staff is an integral part of the entire organization. Specific plans or forms of organizations will not be considered; this is a subject for a treatise on management, the knowledge of which is assumed. The viewpoint will be that of the chemist and chemical engineer in industry, and it is chiefly their literal experiences which will exemplify the good or bad practices of management.

In all industries, the success of a manufactory is primarily a matter of personnel and organization. Disregarding the advantage of one plant over another due to, say, fortuitous control of raw material, over a long period the disparity between plants is due primarily to the organization of each. However, the source of raw material is seldom due to chance alone; often this is the result of a long labor with that objective. For instance, in recent years new domestic sources of bromine, iodine, and magnesium have been created by tapping the sea. The development of these industries was open to anyone, but only certain companies had the organization with the ingenuity to conceive of the objective and to achieve success. In an inefficient plant, its diminishing position in the industry will be attributed to the technological improvements of its competitors, over which it has no control, rather than to its own obsolescence, which is the fault of its management.

Faulty technical organization is found in new plants as well as in

those which have been established a long time. For the new plant the effect of faulty organization may go unnoticed in the primary stages of development, when it is drawing largely on its capital or while it has an uncompetitive market. When this temporary situation terminates, the problem of organization becomes critical, and in order to succeed the plant must have an efficient organization. In these times a marginal producer has slight chance for survival. Among the older plants, which were established when competition was less severe, the improperly organized ones are characterized by lack of normal growth. Over a long period the plant will become a marginal producer in one product after another, followed by contraction, as unprofitable products are abandoned, until final collapse.

The size of the *small* plants under discussion may be as large as one employing several hundred employees, but in function they will all resemble the small plant under the immediate supervision of the owner. The problem of organization is common to small and large companies, but with the distinction that for small companies the problem is acute, while for the large corporation it is settled. In fact, the large corporation exists only because it has solved this problem. The organization is the corporation; the capital and investment are merely the tools with which it functions. It is significant that generally the small subsidiary plant is well organized, since the parent organization is its prototype. *The organization of a small plant should be modeled after that of a large plant.*

To paraphrase the old cook-books: To have an efficient organization, first get the right personnel—but first of all *know* what addition of personnel is required by the organization. Employees should be taken on with the object of building up the organization rather than merely to fill an immediate vacancy. The management should know precisely the qualifications required in a new employer for a proposed reallocation of the existing personnel and for the future growth of the organization.

Personnel can be acquired through recommendation, employment agencies, advertising, and spontaneous application. It is generally conceded that the best employees are obtained through recommendation by a person known to the employer. However, the results of this method depend on the judgment, ability, and integrity of the person making the reference. If the referent misjudges the ability of a man, or if he mistakes the employer's requirements, the results may be worse than if the selection were made at random. The reference may even be made

with the motive of getting rid of a man—the old army game. A certain chemical plant has as chief chemist a man who came highly recommended from its competitor. The directors of the company have no doubt as to his efficiency, and they are particularly proud of his doctorate. Now it happens that this doctorate is self-conferred, and the rest of the technical staff knows it, as well as it knows his incompetence. While the qualification of a chemist for industrial work is not determined solely by an academic degree, a chemist who finds it necessary to assume a fictitious degree is likely to be lacking the necessary qualifications. Because of an improper reference, this plant operates under a great handicap.

When it is necessary to get a man with considerable experience in a certain field, the services of a competent employment agency specializing in technical employment are valuable. In this connection the employment services of technical societies are too often overlooked. Employers should learn that their function is not only to obtain employment for their members, but also to make qualified persons available to industry.

As a last resort employers make use of the want-ads. A few of the advertisements are good, but most of them are poor. In the latter class, either the employer is primarily concerned with the cost of his advertisement, or he does not know what he wants. An advertisement such as the following should go unanswered by chemists: "*COSMETIC CHEMIST, thoroughly experienced; \$20 start; good opportunity, advancement . . .*" (sic); but unfortunately this is not so in these times.

Unsuccessful managements neglect the chance for obtaining valuable employees through spontaneous application. While at the present time employers are deluged with requests for jobs, among these are a few who have something valuable to offer. It would pay well to interview and maintain active contact with applicants of the most promising potential value. Of course, this advice does not apply to those plants where improvement is impossible, or where they are making sufficient profit.

There is no magic formula for determining whether or not an applicant will be satisfactory, but there are methods of selection which give a good chance for success. If employers paid less attention to anthroposcopy and more attention to finding out what it is that the applicant can do, there would be less grief for everyone. The technical bureaus of the Federal Government have staffs with well-earned reputation, yet,

almost without exception, appointments for the junior grades are made from the result of examination without the opportunity for personal interview.

Often an unsatisfactory employee is due to the failure of the employer to see through the exaggerated and subjective description of the applicant's ability. On the one hand, the applicant may be eager to get work at all cost, regardless of whether or not he qualifies or prefers the work. The account of his experience and training is exaggerated to make him apparently qualified for the work, and a credulous employer hires the one with the most convincing story. On the other hand, most applicants do not know how to describe their qualifications to prospective employers. According to A. W. Rahn¹ this is because most persons *do not know themselves* exactly what their abilities are in terms of work functions. Titles of previous employment are meaningless: *chemist, supervisor, chemical engineer*, and so forth, tell nothing. In three different plants the duties of each might be identical. Only an objective description of the exact work done tells anything.

The full qualifications of employees should be learned and kept in mind by the management. An irrelevant qualification at the time of appointment may later become a great asset to the company. Rahn cites the case of a man earning \$25,000 a year who was let go because the company could no longer afford to keep him on. Later when his abilities were completely described to the president of the company, he was put back to work again, opening up and operating a plant that had been idle for two years.

Employment should not be restricted to chemists with experience within the industry, particularly for the junior positions. Manufacture has become more the operation of unit processes common to many fields, and less of unique technical processes applicable only to one field. Often a commonplace procedure or apparatus of one industry may be a useful innovation when introduced into an entirely different field. In a fine chemical plant manufacturing potassium iodide, this salt was lixiviated from hydrated iron oxide by the traditional process of the plant which was modeled after laboratory methods using successive washes of fresh water. A new production chemist with heavy chemical background immediately changed this to a counter-current decantation with resulting economies. Oddly enough, the plant manager

¹ A. W. Rahn: *Your Work Abilities*. (1936) Harper & Brothers.

never credited him with any saving of steam, because the steam was being generated anyway.

The younger chemists and chemical engineers in many plants are frequently started to work in the control laboratory with the promise of work in the production or research laboratories as vacancies occur. Contrary to the usual practice, particularly in plants with poor organization, it would be better to have the control chemists get some plant experience. Thus a chemist in charge of a control laboratory, who had no production experience, set arbitrary standards of quality too far in excess of the competitive trade standard, without realizing that the increased cost of production far outweighed the sales advantage. The former practice is so common, especially in small plants, that its correctness has seldom been questioned. The error lies in the assumption that, like cats in the dark, all chemists are alike. Industrial chemists might be grouped into three types according to their chief qualifications and aptitudes: analytical, engineering, and research. Now, the beginners are given the most monotonous work in the control laboratory which is irksome to all types. On the other hand, if the work consists of difficult chemical analysis, only the analytical type will be capable of the best work, while the other types may be utter failures. Neither is it necessary to have all the routine work of a control laboratory done by chemists. A good practice is to engage chemistry students for routine laboratory work under the supervision of experienced chemists. This leaves the difficult and interesting work to the experienced analytical chemists, and provides a training school from which future chemists can be selected. This is important for the maintenance of the *esprit de corps*, since every employee is afforded a chance for promotion.

The primary function of the plant manager is to operate the plant at the order of the owners, and beyond this he is subjected to no orders. While conforming to the established policy of the company, he operates the plant after his own methods. Despite this liberty of action, in a properly organized plant the work of the plant manager is checked by a comptroller. In a badly organized plant, the owners will attempt to control the work of the manager by supervision, even though they themselves may be incompetent to manage the plant. This type of mismanagement has been observed in a chemical plant doing several million dollars of business annually. In this case, the president of the company, who had altogether no technical training or experience, assumed immediate supervision of the manager's work. Naturally,

under these circumstances the nominal position of manager could not be held by a competent man, and the efficient organization of the technical staff was quite beyond the concept of the president. The result was was virtual anarchy. The authority and the responsibility for the work of the various departments were indefinite. The chief chemist would try out his ideas on regular production, leaving the responsibility for satisfactory production to the production chemists. The manager and the chief chemist were incessantly at odds, each with the idea of discrediting the other. Important processes were without written specifications and process troubles were rampant. Standards of products were set by the caprice or tradition of the sales department, the stock-clerk, or the control chemist. The position of this company in the industry can be imagined.

A plant with a competent manager would be free of the above faults, since the qualifications of the manager determine the character of the organization. The plant manager is the nucleus of the plant organization, which he creates and develops. In this he has not only a responsibility to his employers, but he also has a *moral obligation* to the men he employs. Incidentally, the manager who wastes the talents of his employees most frequently deplores the dearth of capable men, quite oblivious to his own incompetence.

As previously stated, the organization of a small plant should be modeled after that of a large plant. The departments and the administration of management are similar for each, they only differ in the apportionment of duties and the degree of specialization. In the small plant the manager may include the functions of the production manager and chief chemist. A small plant may not have specialists such as a safety engineer or an engineer for standards and cost, yet all plants must have someone to execute these functions. These various functions must be definitely assigned to members of the organization according to their rank and particular aptitude. A man nominally employed as a chemist may have had experience in, say, electrical engineering or control instruments, and these specialties might be utilized in an organization. Extremes in this direction should be avoided. The design of an important ventilating installation should not be plucked out of a hand-book by the non-specialists; ventilating design is the province of the ventilating engineer to whom a handbook is a useful accessory. Secondary qualifications should be applied chiefly as an interpretive function in coöperation with the engineering experts of

reputable contractors or equipment manufacturers. However, beware the subreption of the *sales engineer*!

It is a bad practice for the small plant to undertake the design and construction of standard equipment. The work of the shop should be limited to maintenance, and equipment should be built only when it is necessary for the immediate solution of a process difficulty. Design and construction of special equipment should also be avoided whenever possible. In most cases the design will not be unusual to equipment manufacturers, while if the equipment is actually of novel design this would be all the more reason for it to be developed and constructed by manufacturers of equipment who are expert in the particular field. Construction of equipment would be less frequent if accurate cost records were kept. Either no records are kept, or else the cost is hidden by charging the cost of the work to maintenance. Equipment is most expensive when a Jack-of-all-trades, not content with standard design, sets out to build apparatus after his own ideas. In one plant, a chief chemist had some driers built after his own design. They were rebuilt twice before they were of any practical use, and still they are far inferior in performance to a drier of standard design.

A serious deficiency of a poorly organized plant is the lack of accurate standards of production founded on *costs*. Every plant should have a complete description of plant operations with their standards of production and quality. Production and quality standards are subjected to constant revision, and the establishment of new standards is an important objective of the development department. These standards must be set with reference to costs, and this can only be done by a plant chemist or chemical engineer capable of determining costs. Costs of technical processes can not be determined by the accountants of the business office; neither can the control chemists specify standards. A standard established without reference to cost may result in exorbitant production cost. Thus, in a fine chemical plant the control chemist made the arbitrary specifications for a powdered salt that less than 0.5 per cent should remain on a 100-mesh screen. To obtain this standard, the salt had to be passed several times through a pulverizer and screened. In damp weather this fine-screening of the hygroscopic salt was extremely difficult. Yet the customer's specification was only for a "fine powder," and for this purpose a powder with the following screen analysis was satisfactory: 99.5 per cent through 60-mesh and at least 90 per cent through 80-mesh screen. This powder could be made by one pass through the pulverizer without any fine-screening operation.

The management should have a well-defined policy for maintaining the organization. When employees are taken on with the object of building up the organization rather than merely to fill an immediate vacancy, they require training to weld them into the organization as well as to increase their abilities. The management of small plants should learn that, despite the expense, the training of men should not be left entirely to the large companies. The men should be trained by continually increasing their duties and responsibilities, and by familiarizing them with the functions of their immediate superiors. With such a policy the usual entrance will be at the bottom and the higher positions will be filled by promotion. With proper training for all members of the technical staff, it will be less frequently necessary to take a man from a competitor in order to fill a position.

In a small plant the problems and work of the entire plant should be known to all members of the technical staff, by means of written reports and frequent staff meetings for open discussion. The necessity for exception to this rule is rare. A company with too many trade secrets may be the most backward in the industry, while the leading companies will have altogether no trade secrets. Thus, a certain large baking company will show anyone through its plants, even officials of competitive baking companies, despite the fact that such visitors have been known to adopt its improvements. This is not rashness; improvements may be copied easily, but an efficient organization remains years ahead of its imitators.

Maintaining the organization involves the correlative of interest in the personnel. Some employers make the error of putting all their hopes on one man to the exclusion of others, perhaps finding out too late that they have backed the wrong man. Neither should plant men be considered inferior to those of the business office. Officers of the company should come from the plant as well as from the front office. The board of directors should include someone to interpret manufacturing operations and the economics of the field in the person of the plant manager or his predecessor.

A man should be trusted as long as he is a member of the organization. If he is under the least suspicion he should be dismissed immediately, not only for the good of the organization, but out of fairness to the man. In this connection it should be noted that some employers do not know how to discharge a man properly. They prolong the employment of an unsatisfactory man until they can charge him with

a glaring case of incompetence to justify his peremptory discharge. In the correct way a dismissal is both simple and dignified. If a man proves unsatisfactory after a short period, he is told quite simply and frankly that he must be let go because there is no place for him in the organization. Generally the dismissal can be accomplished without ill-feeling, and indeed, the man may be given a genuine and valuable reference of his qualifications for work with other employers.

In conclusion it is well to discuss and dispose of the delicate subject of salaries. It is about time that all employers realized that in the purchase of services, as with everything else, one gets just as much value as one pays for. The small ailing companies can least afford the penury of paying salaries below the prevailing rate. In plants where the starting salary for chemists is twenty dollars weekly, with correspondingly low salaries for the rest of the staff, do the directors realize that it is this policy which is the primary cause of their diminishing position in the industry? Low salaries can only attract and maintain mediocre employees who contribute nothing to the development of an organization. In times of business depression, many capable technical men are available who are forced to accept any employment available regardless of their ability, but a man obtained *cheaply* will be dear at any price, because he will not be in his right place in the organization. A man of this type may accept the position only as a stop-gap to leave it as soon as something better materializes. If he seriously tries to do work commensurate with his ability, he soon runs into trouble. He becomes an object of jealousy and suspicion, and worse still, he is considered incompetent by his employers, so that for self-protection he avoids doing anything which is new his employer. For example, a young chemical engineer in such a position tried to convince the plant manager that the way to produce large crystals was by controlled agitation, as is done in the Howard crystallizer. He immediately got the reputation of a puddin'-head, because of the common misconception that the largest crystals are obtained without agitation. He soon learned not to attempt to introduce anything which was new to the management, in order to prolong his employment as long as possible. Naturally his stay was short, and his contribution to the organization was nil.

Research workers should not be given a bonus for the successful completion of a research problem. In the first place, they have been hired for this particular work. Secondly, it is improper to credit an

individual with work done by the organization. An important problem for research may be initiated by the acumen of a production chemist, which might require only prosaic work by the research chemists to achieve results. Workers are sufficiently jealous about credit for their work; the management should be satisfied with handling this problem without adding a monetary grievance to it. The work of research workers and of other members of the staff should be recognized by salary increases and promotions corresponding with their increasing value to the organization and its growth. An equitable policy of the management on credit and salaries is most important for sustaining the *esprit de corps*.

Let the small manufacturing plants mend their ways.



Why the Chemist in the Paint and Varnish Industry

By R. J. Gnaedinger, F.A.I.C.

TO THE chemist who is not intimately familiar with paint and varnish production, this industry seems replete with needs and opportunities for men of his profession. Chemists are obviously needed, for example, in making the vast array of synthetic pigments, and in refining the natural pigments used in paints and enamels. They are needed in the synthesis of resins such as phenol-formaldehyde, urea-formaldehyde, glycerol-phthalate, and coumarone products. They are likewise needed in the refining and modifying of drying oils, in the solvent field, in drier manufacture, and in newer ventures in anti-skinning agents, in wetting agents, and in deodorants.

With the exception, however, of a very few of the largest paint and varnish manufacturers, who have built up vertical trusts, the production of the preceding list of materials is vested very largely in unrelated companies, classified loosely as "raw material" producers.

The paint and varnish manufacturing industry is therefore essentially a compounding industry, more concerned (unconsciously at times) with physics and colloids than with chemical synthesis. Even in varnish kettling processes, the heat-polymerization of oils is challenged by some as a mere physical agglomeration of oil molecules; and oil-resin reactions are considered as mere physical or colloidal dispersions of the resin in the agglomerated oil matrix. Only a few varnish processes

such as the "running" of copals, and liming and kindred drier-forming reactions are obviously chemical.

Why, then, should chemists be employed by paint and varnish manufacturers who make neither their pigments nor their resins, their oils or their thinners? Is it to determine by chemical means the purity or uniformity of their materials of production? In general the answer is no. While incoming materials are usually tested, the tests are almost always physical. Chemical tests in most cases not only take too long, but when finished they frequently fail to assure satisfactory performance of the materials.

Does the chemist in this industry determine satisfactory performance of finished paints and varnishes by means of chemical tests? Again, with a few minor or specialized exceptions, the answer is no. Most of the tests of finished products are highly "practical". Some, such as detailed drying time, or weight per gallon, or per cent non-volatile, or viscosity, or even color are more properly "physical".

The answer to the query "why the chemist in the paint and varnish industry" probably must be sought in these two facts: First, the industry is evolved from an "art" rather than from any fundamental scientific background. Second, chemists in industry in general preceded physicists. Scientific thought, procedure, and precision in industry became first associated with the chemist.

The chemist was probably introduced into the paint industry, therefore, to bring general scientific control and guidance to an "art" that had outgrown its swaddling clothes.

With the chemist and his scientific point of view, there came a gradual willingness to try new materials and new processes. Various chemical industries found that they could make or modify products for this new market. And needs of paint and varnish manufacturers were analyzed and specified, so that other new or modified products could be developed to meet them.

The services of the chemist in translating the needs of industrial consumers into understandable paint terms, and then in meeting or bettering the requirements cannot be over-estimated. Nor can his part in taking much of the economic guesswork out of the erstwhile art be ignored. The fact that he has not made greater progress in these two lines of effort is the result of a rather general misuse of his services, rather than because of his own limitations.

The chemist is used in the paint and varnish industry today, first as a control tester, to insure, largely by physical and practical tests, the

uniformity of materials and of finished products. Second, he is expected to develop new, improved, or cheaper formulations for those finished products. He is also expected to evaluate new materials, or materials from new sources in substitution for present materials in his company's products.

Actually, the chemist's effort is almost entirely spent first in control work, second in proving or disproving claims of "raw material" purveyors, and third in matching competitive paint and varnish products.

His attempts to improve his own products are apt to be sporadic and abortive. His efforts to satisfy to a high degree the paint requirements of industrial consumers are frequently misdirected by inadequate knowledge of the customers' detailed need, by orders to *match* the competitive material now being used, and by lack of time.

Much of his time is wasted because he lacks a sufficiently clear understanding of the problem he is expected to solve. More time is wasted because he has no ready reference to past efforts along similar lines, and finds it easier to duplicate those efforts.

The chemist in the paint and varnish industry is dogged by the possibility of frequent changes of position. He is classed as a non-producer since he neither cooks, grinds, tints, fills nor sells. As a non-producer he is a luxury to be eliminated in hard times. He is sometimes expected to be a "miracle-man", pulling the required formula on short notice from his bag of tricks. When his trick bag is suspected of being exhausted, he may be displaced by another chemist, with a brand-new bag of tricks.

The chemist, himself, is at times, woefully lacking in the industrial point of view. His scientific training in open-mindedness causes him to present both sides of a finding to his employer, who wants instead a formula or a plan of action, predigested, definite, understandable, and immediately usable. His direct thinking impels him to direct speech which some executives reject in favor of more subtle, diplomatic wording that seems to cause the executives themselves to give voice to the ideas in question. His academic interest in finding facts for their own intrinsic value leads him at times into work whose practical value to his employer is remote indeed.

Equally at fault, and without the excuse of scientific training is the chemist who allows himself to be trapped into stating a definite opinion before he has done the work which should precede and dictate that opinion, and who then squanders his efforts in attempting to justify that opinion, rather than in establishing the fact. Or again, he leaves an

investigation on which he is embarked, to follow ideas or incidental discoveries which, common sense should tell him, would never carry him to his original goal. Not that those ideas or discoveries should be ignored. They should rather be recorded for future investigation or use.

The competitive sales policy of manufacturers of certain synthetic paint and varnish materials has introduced another difficulty to waste the efforts of the chemist. Trained to associate related chemical compounds, and knowing, for example the characteristics of butyl acetate, he can predict the approximate behavior of octyl acetate or propionate. Or, knowing ester gum, and knowing congo as compared to rosin, he can predict the characteristics of congo ester. But now he is offered Smith resin 4527, Jones resin 8257, Brown resin 1746, and Adams resin 1061, each allegedly the last word in excellence. When he has laboriously evaluated them, and has standardized on Brown resin 1746, he has no knowledge of chemical composition, physical structure or making process to associate with the preferred performance. Nor has he any basis of associated composition and performance to guide him when Smith, Jones, and Adams again descend on him with brand new resins, all allegedly vastly superior to Brown's 1746.

It is, of course, unfair to leave the picture of the paint and varnish chemist as dark as has been painted, accurate though the details of that picture may be. His power of trained observation and of associating cause with effect enables him to change practical procedure to get desired results. His understanding of the first two principles of research, namely the necessity for maintenance and use of a control standard, and the need to change only one variable at a time, when this understanding is not left in the classroom as too pedantic and slow, stands him in good stead. And finally, his keen realization that true research is a seeking after truth—"let the chips fall where they may"—eliminates one by one the illusions, the superstitions, the prejudices that have beset this ancient art grown into an industry, and makes this paint and varnish manufacturing industry one in whose service the chemist may take just pride.



Synthetic Organic Chemicals. World Developments and Foreign Markets has just been released by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce. The authors are C. C. Concannon, F.A.I.C., and J. N. Taylor, F.A.I.C. The Survey may be obtained for twenty cents from the Superintendent of Documents, Washington, D. C.

The Service of the Chemist Advisory Council

By M. R. Bhagwat, F.A.I.C.

At a recent meeting of a technical society, a member of the Board of Directors of Chemist Advisory Council was informally discussing, with a member of the society, the problems confronting unemployed chemists and chemical engineers above forty years of age. A chemical executive, overhearing this discussion, suggested that he might be able to find employment for a properly qualified candidate thoroughly acquainted with various types of machinery and spare parts generally used in a chemical plant. The records of registrants about forty-five years of age who were formerly employed as chemical engineers were studied and those meeting the above requirements were put in touch with the proper person. One of the candidates, who had been unemployed for more than a year, was successful in securing the position which, although non-chemical in nature, later would develop into a semi-executive one. This employment proved to be a timely blessing, relieving probable distress due to depleted resources.



A plant manager, having considerable experience in research and management, called at the Council's office for suggestions in preparing his chronological record of education and experience which he intended using in his campaign for a new connection. While investigating various projects which he had handled during his previous employments, it was disclosed that in addition to his expert knowledge of the principal products manufactured, he possessed very valuable information which could be used by chemical companies manufacturing supplementary products which formed an important part in the success of the main process. The names of companies manufacturing these supplementary products and persons with whom he should correspond were supplied. One of the organizations appearing on the list called him for an interview and after several days of discussions, the company decided to undertake a project where his services could be fittingly used.



A chemist with a Master's degree showed a particular liking for analysis or synthesis of organic compounds. In his campaign towards

securing a suitable position, several names of standard organizations were given. However, his approach was principally from the point of securing employment rather than applying his knowledge to specific problems which may occur in a laboratory devoted to organic research. Patterns of letters applicable to specific instances were suggested. In one case, an employer found the experience described above particularly suitable to his inspection department. Prior to calling on the prospective employer for an interview, the applicant visited the Council's office to secure accurate information regarding the principal products manufactured by the concern, together with some standard reactions which could be carried out in their laboratory. After some discussion on the matter, the registrant then consulted the suggested literature and thoroughly prepared himself for the interview. The interviewer was naturally impressed with the knowledge of the candidate and selected him for the position in question.



A chemist with a number of years' experience in manufacture and sales of specialty products decided to move his family to the Middle-west so that he could conserve his resources, which were depleted due to long unemployment. He corresponded with the Council periodically regarding his various efforts to secure suitable employment, and suggestions were given when requested. One morning, a business executive from the Middle-west called at the Council's office, inquiring if we could put him in touch with someone having experience with certain products. Fortunately, the unemployed chemist had specialized in this line and his name and address were given. After some negotiations, the Council was informed that the position had been offered to the candidate in question.



A recent graduate, woman, called at the Council's office for information regarding chemical companies which might use her services as a technical assistant or secretary-stenographer in the offices of chemical executives. She presented her case remarkably well and apparently had definite desires in relation to the services she could efficiently render, if given an opportunity. Being impressed with her general personal characteristics and knowledge, several suggestions were made and information given regarding companies and persons whom she

might contact. One of the prospective employers, who appeared on this list, later thanked the Council for suggesting that she should call on them, as she was eminently qualified to fill a vacancy which they had open in their organization.

Personality is one of the frequent requirements mentioned by employers in selecting suitable candidates for vacancies arising in their organizations



The National Council of THE AMERICAN INSTITUTE OF CHEMISTS will hold meetings on the second Tuesday of each month at The Chemists' Club, New York, N. Y., unless notified otherwise.

Alcan Hirsch

Alcan Hirsch, F.A.I.C., died in New Rochelle, New York, on November 24, 1938, at the age of fifty-three. He was born in Corpus Christi, Texas, and was educated at the University of Texas, the University of Wisconsin, and Massachusetts Institute of Technology, returning to the University of Wisconsin in 1911 to receive the Ph.D. degree. In 1911 he established the Hirsch Laboratories in New York and was consultant to several industrial corporations, and also to the Japanese Government for two years. He formed the Rector Chemical Company in 1917, and was also one of the founders of the Molybdenum Corporation of America. The Carnegie Award of the Iron and Steel Institute of Great Britain was awarded to him in 1913. In 1915, he introduced the pyrophoric alloy industry into this country. For several years he was chief adviser to the chemical section of the Commissariat of Heavy Industry of the Soviet Union. He specialized in chemical engineering, electrochemistry, electrometallurgy, pharmaceuticals, and dyestuffs, and was the author of several publications, of which one of the most recent was *Industrial Russia*. Dr. Hirsch became a Fellow of THE AMERICAN INSTITUTE OF CHEMISTS in 1928.



COUNCIL OFFICERS

President, Robert J. Moore
Vice-President, J. W. E. HARRISON

Secretary, Howard S. Neiman
Treasurer, BURKE H. KNIGHT

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W. D. TURNER

Niagara
A. W. BURWELL

Philadelphia
GILBERT E. SEIL

Washington
HENRY G. KNIGHT

November Meeting

The one-hundred and fifty-sixth meeting of the Council of THE AMERICAN INSTITUTE OF CHEMISTS was held at The Chemists' Club, 52 East 41st Street, New York, N. Y., on November 7, 1938, at six o'clock p.m.

President Robert J. Moore presided.

The following officers and councilors were present: Messrs. F. G. Breyer, B. H. Knight, R. J. Moore, H. S. Neiman, W. T. Read, G. E. Seil, N. A. Shepard, M. Toch and W. D. Turner. Mr. M. R. Bhagwat and Miss V. F. Kimball were present.

The minutes of the previous meeting were approved.

The Treasurer's report, showing a bank balance as of October 31, 1938, of \$3348.31, was read and accepted.

The Secretary read a letter from Walter William Plechner, F.A.I.C., regarding patents and the Wages and Hours Law. Upon motion made and seconded, the President was requested

to appoint a Committee on Patents to keep the Council informed on the relation of the patent institution to the profession and to advise members of actions which they may take regarding patents; also to cooperate with the patent committees of other societies.

Upon motion made and seconded, the President was requested to appoint a temporary committee to investigate the position of chemists under the Wages and Hours Law.

The Secretary read a letter from Ira Paul, F.A.I.C., regarding the licensing of chemists. This letter was referred to the Committee on Licensing with the request that it be reported on.

The next meeting of the National Council will be held on the thirteenth of December.

The possibility of forming a chapter of the Institute in Chicago was discussed.

The President announced the death of Dr. Allen Rogers, a member of the

Council, and the Secretary was requested to draw up appropriate resolutions.

The Secretary announced that the membership now totals 1339.

The following new members were elected:

FELLOWS

Adams, J. Rivers

(1938), *Production Superintendent and Manager*, The Warner Chemical Company, 405 Lexington Avenue, New York, N. Y.

Anderegg, F. O.

(1938), *Consulting Specialist on Building Materials*, Newark, Ohio.

Ball, Robert W.

(1938), *Research Chemist*, Krebs Pigment Department, E. I. duPont de Nemours and Company, Newport, Delaware.

Bray, Ulric B.

(1938), *Research Chemist*, Union Oil Company of California, Wilmington, California.

Burk, R. E.

(1938), *Professor*, Western Reserve University, Cleveland, Ohio.

Cox, Edwin

(1938), *Assistant Manager*, Phosphate Products Division, Virginia-Carolina Chemical Corporation, Richmond, Virginia.

Crockett, W. G.

(1938), *Professor*, Medical College of Virginia, Richmond, Va.

Culbertson, J. B.

(1938), *Professor of Chemistry*, Department of Chemistry, Cornell College, Mount Vernon, Iowa.

Darby, George M.

(1938), *Director*, Westport Mill, The Dorr Company, Inc., Westport, Conn.

Deignan, J. F.

(1938), *Professor of Chemistry*, Spring Hill College, Spring Hill, Alabama.

Fuller, F. D.

(1938), *Chief*, Division of Feed Control Service, Texas Agricultural Experiment Station, College Station, Tex.

Harmon, Carlyle

(1938), *Research Chemist*, Marathon Paper Mills, Wausau, Wisconsin.

Holmes, Harry N.

(1938), *Head*, Department of Chemistry, Oberlin College, Oberlin, Ohio.

Kline, Hayden B.

(1938), *Research Chemist*, 9801 Wal-ford Avenue, Cleveland, Ohio.

Lessig, E. T.

(1938), *Senior Physicist and Chemist*, The B. F. Goodrich Company, Akron, Ohio.

Lutz, Robert E.

(1938), *Associate Professor*, Cobb Chemical Laboratory, University of Virginia, University, Virginia.

Maas, Arthur R.

(1938), *President*, A. R. Maas Chemical Company, 308 East 8th Street, Los Angeles, California.

McConlogue, W. A.

(1938), *Chemist*, Colgate-Palmolive-Peet Company, 105 Hudson Street, Jersey City, N. J.

McEwen, Joseph L.

(1938), *Production Manager*, Southern Dyestuff Corporation, Charlotte, North Carolina.

Partridge, Edward G.

(1938), *Research Chemist*, B. F. Goodrich Company, Akron, Ohio.

Scoles, D. L.

(1938), *Chairman*, Department of Chemistry, Long Island University, 300 Pearl Street, Brooklyn, N. Y.

Toulouse, J. H.

(1938), *Research Chemist*, Packaging Research Division, Owens-Illinois Glass Co., Toledo, Ohio.

Tucker, Harold H.

(1938), *Research Chemist*, J. Laskin and Sons, Milwaukee, Wisconsin.

Watson, J. W.

(1938), *Head*, Department of Chemistry, Virginia Polytechnic Institute, Blacksburg, Virginia.

ASSOCIATES

Collier, Charles V., Jr.

(A.1938) *Research Biochemist*, Biochemical Research Foundation, 133 South 36th St., Philadelphia, Penna.

Cross, Loy B.

(A.1938) *Instructor in Chemistry*, Emory University, Emory University, Georgia.

Zimmerman, Bernhard G.

(A.1938) *Research Chemist and Chemical Engineer*, General Aniline Works, Inc., Grasselli, N. J.

Upon motion made and seconded, the President was requested to appoint a Committee on Honorary members.

The New York Chapter announced that it would contribute \$50.00 to the Chemist Advisory Council.

Dr. Read, Mr. Breyer, and Mr. Bhagwat discussed the work of the Chemist Advisory Council.

There being no further business, adjournment was taken.



CHAPTERS

New York

Chairman, Frederick Kenney

Vice-chairman, Frederick W. Zerban

Secretary-treasurer, D. H. Jackson

17 John Street

New York, N. Y.

Council Representative, W. D. Turner

A dinner in honor of Maximilian Toch, recent president of THE AMERICAN INSTITUTE OF CHEMISTS, was given by the New York Chapter on November ninth.

Robert J. Moore, president of the INSTITUTE, acted as toastmaster. "These walls," he commented, "will never look upon a meeting of more sincerity nor of greater depth of feeling than is this one tonight. We are here to pledge a token of our most warm esteem. In honoring Dr. Toch, we are honoring ourselves, our Institute and our Club. Dr. Toch is motivated by a primal urge to be useful and he is able to do that so efficiently as to make successful any movement with which he comes into contact."

William Callan, president of The Chemists' Club, testified that the Club loves and reveres Dr. Toch as one of its grand old members whose influence has contributed greatly to its success.

Frederick Kenney, chairman of the New York Chapter, welcomed the visitors and friends who were present to help express the appreciation of the excellent work which Dr. Toch has done for the INSTITUTE; and thanked Dr. Toch on behalf of the INSTITUTE and of the New York Chapter.

Marston Taylor Bogert assured Dr. Toch that he would go home a very happy man. "It is fortunate that you can count your age by years and not by friends, for if you counted your age by your friends then you would

be as old as Methuselah. Every year I have thought more highly of Dr. Toch and appreciated him more. There is no one who has not benefited in some way or other from his contact with Dr. Toch. Max, as you may know, is a fisherman. It is said that there is an area of low veracity along all trout streams, but Max is such an excellent fisherman that he does not have to resort to this area. As to his excellence, you may know that he is able to catch black bass on a number sixty thread line, which takes very great care in order to tire the fish, as the slightest pull will break the line. He is also an expert rifle shot. One of my guides in Maine admires him greatly for this ability to shoot. You all know what an expert he is in photography. But to me, more than any of the things he has done is the fact that I can call him a true friend. In fact it is hard to speak of Max without emotion. Old friends are true friends. New friends are just on trial.

'Tis the human touch in the world
that counts,
The touch of your hand in mine,
Which means far more to a fainting
heart
Than shelter or bread or wine.
'The shelter is gone when the night
is o'er,
And bread lasts only a day;
But the touch of your hand,
The sound of your voice
Sings on in the heart away."

Lawrence Ottinger, President of U. S. Plywood Company, whose first job was held under Dr. Toch, told amusing anecdotes of Dr. Toch's sense of humor, and of practical jokes played on salesmen. "Max and his brother, although they both had some sterling qualities, were quite different. The brother was a man of commerce. Max

was a scientific man. Together they made a marvelous team."

Leo Baekeland then spoke with emotion of what Dr. Toch's friendship had meant to him. "Dr. Toch has meant so very much in my life. After Dr. Bogert's fish stories, I should say that Dr. Toch is an octopus with many arms: He is a chemist, an artist, an engineer, an orator, a manufacturer, an historian, an inventor, a good citizen and a raconteur. He has one grave fault, he never drinks anything except water and coffee. He also smokes vile cigars and tobacco. I still remember the way in which we became acquainted. In Berlin, I was an enthusiastic photographer before dry plates existed. Here in America, I invented the photographic paper with which you are all familiar. After I invented it, I had no backer, and so I got a second-hand press and printed directions for using my paper and then sent out samples with the directions for use. Then, of course, I received complaints from people who had not read the directions. One day I got a letter from someone who said he had used my paper and would like to visit me. I thought it was someone else who was disgruntled because he had not read the directions. There in my tiny laboratory, Dr. Toch came to see me. He had demonstrated my paper to the Camera Club of New York. Can you imagine what that visit meant to a lonely discouraged boy? Max arranged my little success. Max, I want to thank you personally for all that you have meant in my life."

Dr. Toch in his response said: "I feel very happy and very humble about these testimonials. A thing happened which I thought would be one of my failures. I think we do not fashion our lives. Either the jinx is with

us or the good fairy is with us. I became president of THE AMERICAN INSTITUTE OF CHEMISTS against my will. While I was in Guatemala, my name was nominated for president, and when I returned, I found I had been elected."

Dr. Toch then told of some of the things he had done to place the INSTITUTE on a firm financial basis.

Telegrams from many friends who could not be present were read at the conclusion of the meeting.

Niagara

Chairman, William R. Sheridan

Vice-chairman, Maurice C. Taylor

Secretary-treasurer, Carl H. Rasch

1212 Oliver Street

North Tonawanda, N. Y.

News Reporter to THE CHEMIST, George W. Fiero

Council Representative, Arthur W. Burwell

The first fall meeting of the Niagara Chapter was held Friday evening, November fourth, at Norton Hall, University of Buffalo. The speaker of the evening was Professor John E. Cavelti, F.A.I.C., head of the chemistry department of Alleghany College, Meadville, Penna. Dr. Cavelti spoke on "The Pennsylvania Clinical Laboratory Laws and the Profession." He stressed the fact that there is considerable agitation in the medical profession for legislation which would require every clinical laboratory to be headed by a physician, notwithstanding the fact that the laboratories merely report findings without any attempt at diagnosis.

In order to protect the chemist from harmful legislation, there is being organized a chemical society limited to the state of Pennsylvania. Although there are several sections of the Ameri-

can Chemical Society, none of them are state-wide nor limited to the boundaries of the state. It is imperative to have an organization which is state-wide, but also limited to the state and incorporated in the state.

Following the very interesting talk, there was considerable discussion concerning legislation of that type and legislation which would require licensing of chemists. It was pointed out that many states, like Pennsylvania, do not have state chemical organizations. The following recommendation was adapted: "That THE AMERICAN INSTITUTE OF CHEMISTS shall maintain its boundaries along state lines in order that the INSTITUTE shall have legal standing in each state."

Dr. Cavelti's talk will be printed in greater detail in a future issue of THE CHEMIST.

Pennsylvania

Chairman, George Russell Bancroft

Vice-Chairman, Walter L. Obold

Secretary-treasurer, Harry C. Winter

4742 Pine Street

Philadelphia, Penna.

Council Representative, Gilbert E. Seil

Washington

*Honorary President, Charles E. Munroe**President, Frank O. Lundstrom**Vice-President, Albin H. Warth**Treasurer, Joseph J. Stubbs**Secretary, A. P. Bradshaw*

2121 New York Avenue, Washington, D. C.

*News Reporter to THE CHEMIST, G. P. Walton**Council Representative, Henry G. Knight**Executive Committee*

M. S. Anderson

J. H. Hibben

R. M. Mehurin

E. F. Synder

P. R. Dawson

L. N. Markwood

A. R. Merz

E. K. Ventre

R. B. Deemer

N. W. Matthews

H. P. Newton

C. W. Whittaker

H. C. Fuller

J. W. McBurney

W. M. Noble

J. F. Williams

L. R. Heiss

A. L. Mehring

W. H. Ross

P. A. Wright

The new administration of the Washington Chapter, led by President Frank Lundstrom, is starting the present active season with energy, enthusiasm, and a well-planned program, not only for the entertainment of the members, but for progress in conditions that affect the chemist, as well.

Dr. Charles Snowden Piggot, of the Geophysical Laboratory, Carnegie Institution of Washington, was guest speaker at the November luncheon meeting of the Washington Chapter, held Thursday, the tenth, in the Department of Agriculture South Building. His theme, "Seabottom Profiles", was presented briefly, but in most interesting fashion, to an attentive group of some thirty-six members and guests.

Prior to the successful taking of core samples of deep-sea bottoms by Dr. Piggot, about 1935-36, only the top few inches of the very deep bottoms had been investigated. However, some of these early samples, "handfuls" taken at great depths by means of the "telegraph snapper", had been examined as to radium content by Dr. Piggot, and found to be significantly richer in Ra than the more abundant of the rocks comprising the "crust" of the earth.

This led him to undertake an investigation of the composition of the ocean floor, especially far out from land in the depths of the open ocean, where the floor deposits, it is believed, have been practically undisturbed since the beginnings of the ocean itself, and resulted in the devising of the gun-and-tube-projectile form of core sampling apparatus used by Dr. Piggot in these researches.

This core sampler for ocean bottom work is ingenious in design and wholly efficient. The loaded gun is fired by the impact of the sampling tube with the seabottom; and the explosion drives the tube-projectile as much as ten feet into the layers of sediment.

On being brought to the laboratory, each tube with its contained core is split lengthwise for study. Perfect, undistorted, ten-foot cores have been obtained from the ocean bottom, from as much as three miles below the surface. Considerable information has already been obtained from the historical record thus laid bare, not only along chemical, mineralogical, and biological lines, but also about changes that have taken place in the earth's magnetic field, shown by the orientation of minute particles of magnetic material in the cores. H. G. Byers, F.A.I.C.

of the U. S. Department of Agriculture, is finding in these cores the lost selenium, present in the river waters going out to the seas, but not found in seawater.

But volumes of unsuspected facts remain, as yet, undiscovered. Ocean floor core samples should be obtained from many more highly promising areas (e.g. the deltas of such great rivers as the Amazon, whose waters have been relatively unaffected by the industries of civilization); and here, it would

seem, lie a real opportunity for some wealthy patron of science, owner of an ocean-going yacht, to collaborate in a scientific venture that would be certain to pay splendid dividends in scientific information and discovery.

A detailed account of Dr. Piggot's work in this field, entitled, "Core Samples of the Ocean Bottom and their Significance", has been published in *The Scientific Monthly*, Vol. 46, No. 3, pp. 201-217, March 1938 (nine illustrations).

THE SCIENCE ANGLER

Kenneth E. Shull, J.A.I.C.

The possibility of obtaining gold from the ocean has held the attention of man for many ages. As a result, there have been developed many different methods for extracting this valuable element. One of these depends upon an electrolytic reaction; another involves filtration of the water through charcoal, leaching the charcoal with potassium cyanide solution, and electrolyzing the resulting solution. None of these processes are practical from a financial point of view, the reason being that gold is present in the ocean in such minute quantities.

A recent analysis of sea water indicates that, contrary to the statements of many books and journals, the gold content actually amounts to less than 0.2 mg. per metric ton. With the present price of gold at \$35. per ounce, the value of the gold contained in a metric ton of sea water is less than \$0.0001.



Hydrogen peroxide now has another use besides its historic one of transforming the color of milady's cranial upholstery. Fish, when treated with a 1:100 dilution of 30 per cent hydrogen

peroxide have been found to remain in a state of preservation much longer than untreated ones. This process should permit the transportation of choice morsels of aquatic life over long distances.



Quite interesting is the fact that plants have been found to possess definite "drinking hours", during which time more water is absorbed by the roots than is lost by transpiration. As a general rule, the period of maximum water absorption lies between twelve and four o'clock in the afternoon.

Man, whose "thirst quenching hours" are not nearly so constant has much to learn from his friends of the Plant Kingdom.



"Ice never fails!" Accordingly when an engineer wishes to lay a pipe in a certain difficultly accessible nook or cranny, he simply supports it on a cake of solidified water, and, as the conversion to aqua takes place, the pipe is slowly lowered into its desired position.

Those busy-bodies, who are continually poking their proboscides into other people's affairs, are in reality utilizing the most sensitive sense inherent to man. The nose, an organ of spectroscopic sensitivity, is capable of detecting, in certain instances, as little as a billionth of a milligram of some substances. Chlorophenol is said to be perceptible when present to the extent of only 0.000,004 milligrams per liter, artificial musk in a concentration of about 0.000,000,005 milligrams per liter, and vanillin in a concentration of about 0.000,000,000,2 milligrams per liter.



It appears as though coal is becoming one of the most versatile of natural products. And paradoxical as it may seem, one of its latest offspring is soap—yes, pure white soap, probably destined to be used for the removal of coal dirt.

Actually it is the fat extracted from

coal which is subjected to saponification as in the manufacture of ordinary soaps. Although somewhat higher in price "coal" soap is said to possess all of the characteristics of a good detergent.



Oligodynamy, a word of length, actually deals with minute things. Properly defined it refers to the specific activity exerted by minute concentrations of certain metal ions. Worthy examples of this phenomenon may be found throughout the field of science. Consider the small amount of copper necessary to inhibit and destroy algae growths (as low as 0.05 p.p.m. of copper sulfate) in water. Silver likewise is conspicuous by its near absence. One of the most recent methods for sterilizing water depends upon the presence of an unbelievably small amount of silver ion in the water.

NORTHERN LIGHTS

By Howard W. Post, F.A.I.C.

"... shoes and ships and sealing wax..."

Undoubtedly the author of those words was neither diplomat nor politician, but his phrase seems to fit into the heading of this month's news. The new British Empire-American trade treaties have filled our papers these last few weeks with items, explanations, and predictions.

It seems that the process of passing and repassing the border has been considerably facilitated. A large number of edibles may now be sent to Canada from this country at reduced tariffs. Included in this group are such things as pork, both live and otherwise, beef,

veal, poultry, and game, with duties now in force which are from fourteen to fifty per cent less than they were before the treaty went into effect. Vegetables, certain fruits, etc., also come under this heading. With these as raw materials, Canadian workmen will turn out, in turn, their own items of export, as further study of the schedules will show.

Newsprint will continue on the free list. Common salt can now be shipped this way at reduced tariff. Unfinished cast iron products, aluminum, nickel, and zinc also come in for their share in

this downward scaling of American import duties.

Then once more the tide turns, and we find that American workmen will use these materials in the manufacture of still more articles of export. Aircraft, steel, iron couplings or fittings, etc., all will travel back north for less duty than before.

It's a great game, and we would venture again an opinion, which is not

original with us, that, as a means to world peace, the achievement of national self-sufficiency and the continuance of high import duties are snares and delusions. Only when a nation is convinced of its own economic self-sufficiency does it intentionally venture into war, and only when nations learn to practice economic and cultural dependence, will the war-like ambitions of certain of them be at all curbed.

CHEMISTS

Alexander Silverman, F.A.I.C., head of the Department of Chemistry in the University of Pittsburgh, has been elected to membership in the American Institute of Ceramic Engineers.



Henry G. Knight, F.A.I.C., Chief of the Bureau of Chemistry and Soils, informs us that the Department of Agriculture is in need of more than twenty-five principal chemists and principal chemical engineers, to be appointed as project leaders in the four regional research laboratories being set up in accordance with an act of the last Congress. Work in the laboratories, each of which has an appropriation of one million dollars a year, will be based on the major farm commodities in the region where the laboratory is located. Particularly are men needed who have

specialized on such subjects as cellulose, especially cotton fiber, starch, oil, protein, and organic analysis, and who have demonstrated their ability to direct both fundamental and applied research in these fields.

The project leaders in these laboratories will be entirely responsible for the work done on the specific problems to which they are assigned, subject only to general supervision by the director of the laboratory. "There are undoubtedly many men in the profession," said Dr. Knight, "whose interest in some branch of chemistry or chemical engineering is so absorbing that the attainment of preeminence in that line of work is a cherished ambition. To such men, the new research laboratories present an exceptional opportunity."

Further information about these positions may be found on page — of this issue of THE CHEMIST.

J. T. Baker Chemical Company Eastern Fellowship for Research in Analytical Chemistry.

The J. T. Baker Chemical Company has announced that its Eastern Fellowship for Research in Analytical Chemistry will be open for 1939-40. The object of this fellowship is to encourage and to assist fundamental research in analytical chemistry. The recipient will

receive \$1,000 annually and will be expected to devote at least nine months to research in an institution conferring the Ph.D. or Sc.D. degree in chemistry in one of the New England States, New York, New Jersey, Pennsylvania, Delaware, Maryland, or Virginia.

The fellowship is awarded by a committee consisting of Professors N. H. Furman, F.A.I.C., Chairman, Princeton University; J. H. Yoe, F.A.I.C., Secretary, University of Virginia; G. P. Baxter, Harvard University; H. A. Fales, Columbia University; and C. W. Mason, Cornell University.

A candidate for this fellowship must possess the following qualifications:

- (a) A Bachelor's degree or its equivalent.

- (b) A broad training in the fundamental branches of chemistry, including inorganic, organic, and physical chemistry as well as qualitative and quantitative analysis.

Applications should be sent to Professor John H. Yoe, F.A.I.C., University of Virginia, Charlottesville, Virginia, not later than February 1, 1939. Further details will be furnished upon request.

BOOKS

AN INTRODUCTORY COURSE IN PHYSICAL CHEMISTRY. By Worth Huff Rodebush and Esther Kittredge Rodebush. Second Edition. 468 pages. *D. Van Nostrand Company, Inc., New York, N. Y.* 1938. Price \$3.75.

Since the volume under consideration is the second edition of a rather well-known work, and many are familiar with the first edition, it is well first to compare the new with the old before discussing the merits of the book. The authors have kept to the plan, subject matter, and words of the first edition fairly closely. There are still seventeen chapters. The first eight of these are identical, word for word with the first eight in the old book, except for a few corrections and additions, particularly in the discussion of chemical equilibrium.

Chapters nine through twelve have been rearranged so that the order of topics now is: Conduction; the second and third laws of thermodynamics; equilibria involving ions in solution, and electrode potentials. Some matter on weak electrolytes has been omitted, whereas conduction and electrode potentials are treated essentially as before. The section on thermodynamics has been drastically revised. Beginning with

the consideration of maximum work and the conditions of reversibility, the authors pass to the second law and the concept of entropy, then to the concept of absolute quantities, the third law, free energy, and activity. The improvement in the logic of presentation is great, but there is still something to be desired in the way of visualizing thermodynamic quantities and relationships and presenting them in an understandable manner. The authors seem loath to use concrete physical examples, to define their terms in words, or to define them in one place in the book.

The remaining chapters have been much improved by the inclusion of discussions of bond energies, absorption spectra, of the "ultimate" particles and the nucleus of atoms, of induced radioactivity, and some new material on activation of molecules and rates of reaction.

The non-mathematical parts of this book are very interesting and understandable. The authors have the ability to give a great deal of information and explanation, that others might omit, in a small space. For instance, the phenomena of maximum and minimum boiling mixtures are explained very briefly but clearly. When they apply the method

of briefness to mathematical discussions, however, the student becomes lost. He is presented with a lump of indigestible material with no explanations or derivations. This is a needless discouragement to the beginner.

The book is good as a supplementary text, and if used with a recognition of its fault by the instructor, should be a good classroom text, as it contains many excellent chapters.

—Thomas Wheat, J.A.I.C.



U. S. Department of Agriculture Announces Locations for Regional Laboratories

The four regional research laboratories, authorized by the last Congress to search for new and wider industrial outlets and markets for agricultural commodities, will be located at the following places:

Northern Region—Peoria, Illinois

Southern Region—New Orleans, La.

Eastern Region—Philadelphia, Pa.

Western Region—San Francisco Bay Area.

The Northern Laboratory will study corn, wheat, and agricultural wastes; the Southern Laboratory cotton, sweet potatoes, and peanuts; the Eastern Laboratory tobacco, milk products, apples, potatoes, and vegetables; and the Western Laboratory wheat, potatoes, alfalfa, vegetables, and fruit other than apples.

EMPLOYMENT

Chemists Available

CHEMIST, M.S. degree, age 37, desires position in laboratory or classroom. Experienced in both analytical work and teaching. Steel, rubber, heavy chemicals. As teacher would prefer small junior college. Please reply to Box 93, THE CHEMIST.

ORGANIC CHEMIST, F.A.I.C., Ph.D. in synthetic organic chemistry; age 27, experienced in microchemistry. Industrial research experience. Now employed assistant instructor in eastern university; seeking industrial research position or permanent teaching position with opportunity for research. Member of Sigma Xi, Phi Lambda Upsilon; location immaterial; available immediately. Please reply to Box 91, THE CHEMIST.

SENIOR RESEARCH CHEMIST, F.A.I.C., wishes position. A.B. and Ch.E. degrees. Age 37. Thirteen years' experience in asphalt, non-ferrous metals, and all phases of petroleum refining and research. Please reply to Box 99, THE CHEMIST.

INDUSTRIAL CHEMIST. Position wanted by F.A.I.C. Twenty-two years' experience in industrial research and plant operation; individual work and supervision. Specialties: dyes, pharmaceuticals, intermediates, vitamins, both water and oil soluble. Plant design and construction. Ph.D. from leading American University. Member American Institute of Chemical Engineers. Organic and biological chemistry. Please reply to Box 95, THE CHEMIST.

CHEMICAL ENGINEER, F.A.I.C., Age 33. Wants to organize and operate a trouble-shooting and operations development department in a medium-sized manufacturing plant. Varied experience with Bureau of Standards, Du Pont, and others qualified me for this work in many fields. Please reply to Box 111, THE CHEMIST.

CHEMIST-BACTERIOLOGIST, A. A. I. C. Analytical, research development. Pulp, paper and by-products; distilled alcoholic beverages; dairy products; brewery; soap, pharmaceuticals, and cosmetics; general food investigations. Please reply to Box 101, THE CHEMIST.

INDUSTRIAL CHEMIST, F.A.I.C., Harvard Graduate; age 36. Ten years' plant and laboratory experience. Pulp, paper, paper board mills; cellulose plastics; mineral pigments; dyes; starches, resins and waxes. Available immediately. Please reply to Box 103, THE CHEMIST.

ORGANIC CHEMIST, F.A.I.C., Ph.D. in synthetic organic chemistry; age 27, single. Experienced in organic synthesis, has designed and supervised work in microchemical laboratory; year industrial research experience (thiourea resins); third year assistant instructor in eastern university; seeking industrial research position. Publication; member Sigma Xi, Phi Lambda Upsilon; location immaterial, available at short notice. Please reply to Box 105, THE CHEMIST.

BIOCHEMIST, Ph.D., M.D., F.A.I.C. American citizen. 20 years' research experience (Germany, U. S. A., South America). Affiliated with South American leading society. Valuable connections in South American government circles. Languages. Thorough knowledge of South American markets and expansion possibilities of United States interests. Country most familiar with: Chile. (Argentina.) Seeks position with American firm here or in South American country. Please reply to Box 121, THE CHEMIST.

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